Assembly Of Mini Canal Air Vents

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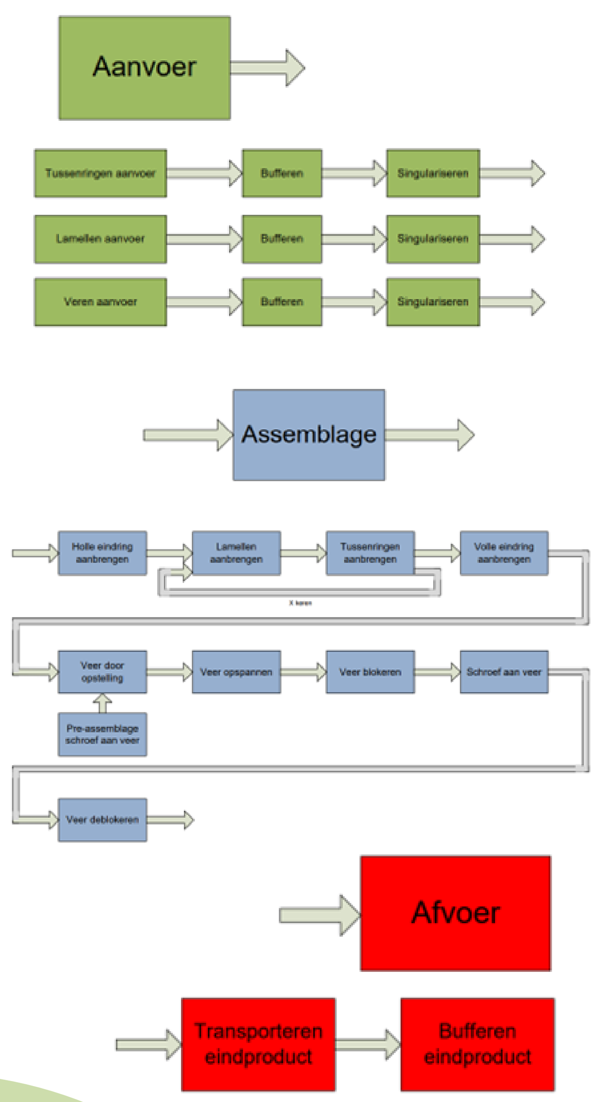
Bridging programme for Master of Electromechanical Engineering Technology

Phase 1: Determine their problem

Jaga is a Belgium-based company, specializing in heating, ventilation and air conditioning (HVAC). Jaga is best known for designing and manufacturing radiators. Here they strive to be climate conscious and develop heat exchangers with an eye for design. These heat exchangers can be built in different ways e.g. against a wall or on ceilings, in floors, etc.... A grille is placed over the recess when heat exchangers are built into floors. This air grille prevents people from falling into the recess in the floor and provides hot air in front of big windows or doors.

The production process for manufacturing the gratings is currently not sufficiently efficient, neither cost-effective nor ergonomic. First of all, these grilles are now manufactured manually by one employee in Jaga. This results in a long production time when multiple vents need to be manufactured. The average time to make a grille with a standard length of 1.20 m takes 8 min. This is **not efficient**. Automating the process will drastically reduce this production time. Next, it is **not profitable** to manufacture the grilles manually because the production time is very long and the one worker costs Jaga a lot of money. By automating, the production time is reduced and this process will be semi- to fully autonomous. This will make manufacturing the air diffusers a more cost-effective process. Finally, this process is not ergonomic since the employee has to assemble the components in the same way for 8 hours a day. This creates a repetitive posture that is **not ergonomic**.



Phase 2: Research, requirements and action plan

The main goal is to design a technical device, on behalf of Jaga, that will **automate the assembly of their mini canal air ve**nts, the aim being to achieve this most compactly and efficiently possible. Therefore we got in contact with engineers and employees who are aware of the current situation. Together we drew up a set of requirements that our design will meet. Some of the most **important requirements** are listed below:

- Total length of 1m20 +0.00mm -2.00mm
- Provide a supply chain of all components, an assembling process, and buffer the assembled products
- The machine should be capable to assembly at least 8 vents per hour
- Provide easy and ergonomic maintenance
- Make only use of their current suppliers or suppliers in the neighborhood

Based on this set we determined the functions which our design should have to be able to assemble the product. These functions can be fulfilled in many different ways. To make easier and better decisions we made use of a **morphological summary** in which we group all our solutions per function. With all our functions now set we can come up with the final step of our action plan which is a **function block overview** of the process. This function block overview can be found on the left.

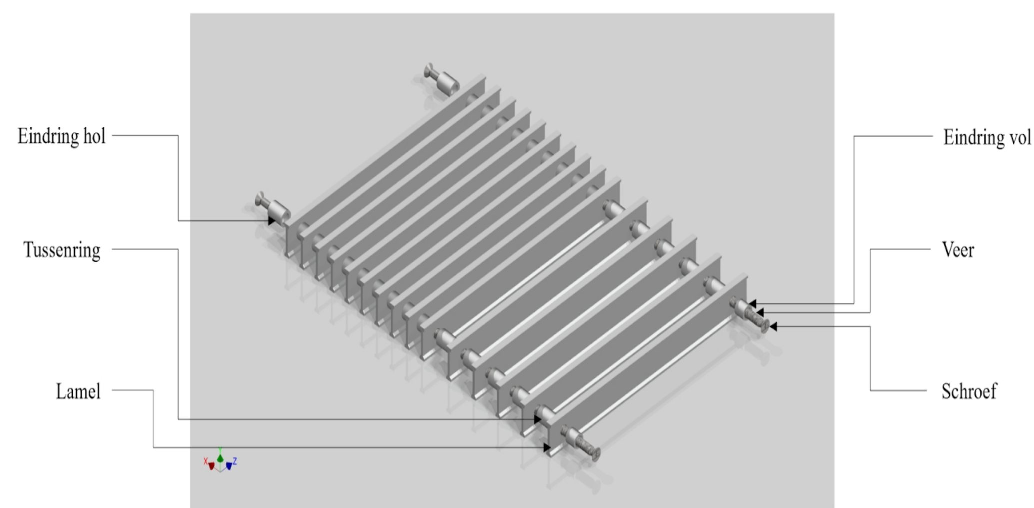
Problem situation

Research

Final Result

CAD Design

Supply assembly



Phase 4: The final result

After implementing our machine in the JAGA plant at Diepenbeek the mini canal air vents are now assembled automatically. The process is now much more efficient since they are able to produce more vents in an hour than before. Which makes this process financially much more profitable. The assembling process is also much more ergonomic than before since the employee has a much more diverse range of tasks instead of doing repetitive manipulations for hours.

Phase 3: Our CAD-Design process

We started our 3D-design process how every design process should start. This is by making a good sketch of our machine. Then we started by dividing the task of who would do which part of the machine. One of the main problems with this sort of cooperation is not about each one developing his own part of the machine but more about afterward reassembling our 3D subassemblies. To not make these mistakes we made clear agreements about the connecting parts and available space.

Our design consists of two big parts. First the **assembling part** and second the **supply part** of all the components which will be assembled into an air vent. The supply part of the machine makes sure that every little screw, ring or spring is located in the exactly determined position. This makes the assembling part easier since the neatly positioned components fall over a long stick, this is achieved by using only a gravitational force.

As a CAD package, we use **Creo Parametric** from PTC. In the first semester of this academic year, we learned a lot about the basics of this cad package as well as some advanced features which will be useful for our CAD design. One of the benefits of this CAD package is that it's very easy to visualize the design. That's why we want to ask you to open your smartphone, scan the qr-code and the CREO thingmark (in the vuforia app) and discover our total machine using augmented reality.

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